

An AP Biology point is earned by naming the mechanism, not the phenomenon. “Osmosis” is not an explanation; water moving down a water-potential gradient is. Learn each sentence below as a whole, then practise finishing it with “which causes ...”. 生物题的得分点是机制而非现象: 写出术语后必须接着说明 “因此发生了什么”。

Chemistry of life and cells

Enzyme 酶 — a biological catalyst that lowers the activation energy of a reaction by binding its substrate at an active site, and is not consumed

Activation energy 活化能 — the minimum energy that colliding reactants must have for a reaction to proceed

Diffusion 扩散 — the net movement of particles from a region of higher to lower concentration, down the gradient and without energy input

Osmosis 渗透 — the diffusion of water across a selectively permeable membrane, from higher to lower water potential

Water potential 水势 — the potential energy of water per unit volume; water moves from high to low water potential, and adding solute lowers it

Active transport 主动运输 — the movement of a substance against its concentration gradient by a membrane protein, requiring energy from ATP

Phospholipid bilayer 磷脂双分子层 — the two-layer membrane structure in which hydrophilic heads face the aqueous surroundings and hydrophobic tails face inward

Surface-area-to-volume ratio 表面积体积比 — the ratio that limits cell size: as volume grows faster than surface area, exchange across the membrane cannot keep up with demand

Cellular energetics

ATP 三磷酸腺苷 — the cell’s immediate energy currency; hydrolysis of its terminal phosphate bond releases energy that drives endergonic reactions

Glycolysis 糖酵解 — the cytosolic pathway that splits glucose into two pyruvate, producing a net 2 ATP and 2 NADH without oxygen

Krebs cycle 克雷布斯循环 — the mitochondrial matrix cycle that oxidises acetyl-CoA completely to CO₂, generating NADH, FADH₂ and ATP

Oxidative phosphorylation 氧化磷酸化 — ATP synthesis driven by the electron transport chain, with oxygen as the final electron acceptor

Chemiosmosis 化学渗透 — the synthesis of ATP by ATP synthase, powered by protons flowing back down the gradient established across a membrane

Photosynthesis 光合作用 — the conversion of light energy into chemical energy stored in glucose, using CO₂ and water and releasing O₂

Calvin cycle 卡尔文循环 — the light-independent stroma reactions that fix CO₂ onto RuBP and reduce it to sugar using ATP and NADPH

Communication and the cell cycle

Signal transduction 信号转导 — the sequence in which a ligand binds a receptor, the signal is relayed and amplified inside the cell, and a response is produced

Negative feedback 负反馈 — a control loop in which the response opposes the change that triggered it, returning the variable toward a set point

Positive feedback 正反馈 — a control loop in which the response amplifies the change that triggered it, driving the system away from the starting state

Mitosis 有丝分裂 — nuclear division producing two genetically identical diploid daughter nuclei

Meiosis 减数分裂 — two rounds of division producing four genetically distinct haploid cells from one diploid cell

Crossing over 交叉互换 — the exchange of segments between homologous chromosomes in prophase I, which generates new allele combinations

Independent assortment 自由组合 — the random orientation of homologous pairs at metaphase I, so each pair segregates independently of the others

Heredity and gene expression

Genotype 基因型 — the set of alleles an organism carries for a gene

Phenotype 表型 — the observable characteristic produced by a genotype interacting with the environment

Transcription 转录 — the synthesis of mRNA from a DNA template by RNA polymerase

Translation 翻译 — the synthesis of a polypeptide at the ribosome, in which tRNA anticodons pair with mRNA codons

Operon 操纵子 — a cluster of prokaryotic genes transcribed together under one promoter and operator

Mutation 突变 — a change in the DNA base sequence; it is the ultimate source of new genetic variation

Evolution and ecology

Natural selection 自然选择 — the process by which heritable variations that improve survival and reproduction become more common over generations

Genetic drift 遗传漂变 — random change in allele frequencies between generations, with the greatest effect in small populations

Hardy-Weinberg equilibrium 哈迪-温伯格平衡 — the condition in which allele frequencies do not change, requiring no selection, no mutation, no migration, random mating and a large population

Speciation 物种形成 — the process by which one population splits into two that can no longer interbreed

Carrying capacity 承载力 — the maximum population size an environment can sustain given its limiting resources

Trophic level 营养级 — a feeding position in a food chain; roughly 10% of the energy at one level passes to the next

Keystone species 关键种 — a species whose effect on community structure is disproportionately large relative to its abundance

Biodiversity 生物多样性 — the variety of species, genes and ecosystems in an area; higher diversity generally increases resilience to change